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Predicting enlistment behavior from stated intentions and demographic characteristics

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PREDICTING ENLISTMENT BEHAVIOR
FROM STATED INTENTIONS AND
DEMOGRAPHIC CHARACTERISTICS

by

Lieutenant James A. Sinkiewicz

December, 1990

Thesis Advisor: Linda Gorman

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This thesis uses a logit model to predict enlistment probabilities using stated intention measures and background characteristics from a sample of nearly 20,000 men age 16 to 21, who responded to the Youth Attitude Tracking Study II (YATSII) survey for the years 1984 through 1989. Those respondents who volunteered their social security number during the survey were matched with Military Entrance Processing Station Reporting System records to determine their actual enlistment behavior. The YATSII survey contains both aided and unaided mention questions designed to gauge the respondent's intentions and motivations toward military service. This study finds that measures of propensity are significant determinants of enlistment behavior, but that their effectiveness may have diminished somewhat from previous studies. The data suggest that 10 percent of the most positive propensity men enlist compared to the 36 percent found in a study conducted with data eight years earlier than that used in this study

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Predicting Enlistment Behavior from Stated Intentions and Demographic Characteristics

by

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ABSTRACT

This thesis uses a logit model to predict enlistment probabilities using stated intention measures and background characteristics from a sample of nearly 20,000 men age 16 to 21, who responded to the Youth Attitude Tracking Study II (YATSII) survey for the years 1984 through 1989. Those respondents who volunteered their social security number during the survey were matched with Military Entrance Processing Station Reporting System records to determine their actual enlistment behavior. The YATSII survey contains both aided and unaided mention questions designed to gauge the respondent's intentions and motivations toward military service. This study finds that measures of propensity are significant determinants of enlistment behavior, but that their effectiveness may have diminished somewhat from previous studies. The data suggests that 10 percent of the most positive propensity men enlist compared to the 36 percent found in a study conducted with data eight years earlier than that used in this study.

TABLE OF CONTENTS

I. INTRODUCTION

The military draft was in effect for nearly three decades, from the troop buildup of 1940 prior to U.S. involvement in World War II until nearly the end of the Vietnam war in 1973. During the draft years, the military did not have to compete with private industry for labor.[1] Now that the draft has ended, the military can no longer have its pick of the labor supply pool, and it has become much harder to recruit enough high-quality[2] enlistees to maintain prescribed force levels. This has become particularly true more recently, as both the size of the youth population and the size of the defense budget have declined.

Low cost, effective, recruiting requires a detailed understanding of the size, location, and composition of the military labor supply pool. One relatively inexpensive method of collecting important information is a random survey of a representative sample of the population that one wishes to

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[1] Although some waivers from the draft were given to individuals who held important defense-related jobs, this represented only a tiny portion of civilian labor pool eligible for the draft.

[2] The military currently seeks those individuals who will score in the upper mental categories (I-IIIA). These mental categories are derived from scores on a standardized entrance test such as the Armed Forces Qualification Test (AFQT). Test scores are used to differentiate between mental groups I and II (above average), IIIA and IIIB (average), and IV-V (below average).

study. Realizing this, the Department of Defense authorized the Youth Attitude Tracking Study (YATS) in 1976. The YATS includes a survey of nearly 10,000 men and women each year. Although there have been some changes in the survey over the years, the intent has always been to gauge the attitudes and motivations of America's youth population toward military service, and to monitor any changes in it. The issue with respect to recruiting is in the implication that if these intention measures are related to enlistment behavior in a predictable way, then propensity can be used to estimate the size, location and composition of the military labor supply pool. This is important in targeting recruiting efforts, setting fair recruiting goals and evaluating recruiter performance.

Pioneering work in determining the relationship of these interest and motivational factors with actual enlistment behavior was done by Orvis (1982, 1984, 1986) and Orvis and Gahart (1985). These studies focused on the stated enlistment intentions of the survey respondent, as a measure of propensity toward military service, and on the extent to which they equated to actual enlistment behavior. The Orvis and Gahart studies used YATS data from the spring of 1976 through the fall of 1981, a period immediately following the end of the Vietnam war, when anti-military sentiment was high. Their results indicated that stated intentions were significantly related to the probability of enlisting and that intentions

provide important information about a person's enlistment probability not found in respondent's demographic or background characteristics (Orvis 1986, p.v). Other studies found that factors such as a desire for a college education, parent's income, and prevailing labor market conditions. interact to influence the enlistment decision (Hosek, 1985).

Although interest in the military in general, and in the Navy specifically, was found to be significant in explaining the different enlistment rates in various Navy Recruiting Districts (NRDs)[3], the Navy does not use interest or propensity measures when forecasting enlistments. Below is example of the problems lack of propensity measures can create:

> Consider an excellent recruiter sent to a college town whose inhabitants view the military with distaste. Under an appraisal system lacking an interest adjustment factor, he could receive a much lower performance rating than a mediocre recruiter in an area whose inhabitants view the military as the only avenue of advancement (Gorman, et. al.,1990, p. 6).

With interest playing such a seemingly important role in predicting enlistment behavior, why is it that the Navy does not use interest measures to fairly and more accurately assess labor supply pools and assign recruiters accordingly? The answer, it seems, is that the Navy has had little success in measuring propensity within specified markets.

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[3] See **Siegel et. al., 1981.**

The Marine Corps tried to capture propensity in setting recruiting quotas by using the following formula:[4]

$$Quota = K * (Special\ Market) * (Propensity) \quad (1)$$

where

$$Special\ Market = .63\ QMA(I\text{-}IIIA) + .36\ QMA(IIIB) + .01\ QMA(IV) \quad (2)$$

Here, QMA stands for the number of Qualified Military Available within a specific area.[5] The propensity component was a function of the following:[6]

- Youth Attitude Tracking Survey (YATS)
- Priority prospect card (PPC) return rate
- Unemployment rate
- Recruiter productivity rate

One problem with this method is that the first three components of the propensity function are not related to aptitude scores, and therefore, give little indication of quality. Secondly, the unemployment rate used is the adult unemployment rate, not that of the youth population. And

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[4] Headquarters Marine Corp. FY88 Fairshare Quota Distribution. Undated.

[5] That portion of the youth population that is physically, mentally and morally qualified to join the military service is known as the qualified military available or QMA for short. Thus the term "qualified" refers to the ability of an individual to pass the military entrance requirements. The term "available" is generally applied to those individuals who have not completed there second year of college, and are not institutionalized.

[6] For a complete discussion, see **Sims, 1987.**

finally, the productivity of the recruiter is driven by past requirements. These problems have forced the Marine Corps to abandon this method of quota allocation at the local level.

Perhaps one reason for the inadequacies of past uses of propensity measures in recruiting was the precision and reliability of the propensity measure itself. This thesis compares those findings with results from a more recent data set to investigate whether the relationship between stated intentions and actual enlistment behavior has changed since the Orvis and Gahart studies. The study uses a logit model to predict enlistment probabilities using stated intention measures and background characteristics from nearly 20,000 men age 16 to 21, who responded to the YATS survey from the years 1984 through 1989. Those respondents who volunteered their Social Security Number (SSN) were matched with Military Entrance Processing Station (MEPS) Reporting System (MRS) records to find their actual enlistment behavior.

The data suggest that measures of propensity remain significant determinants of enlistment behavior, but that their predictive ability may have decreased somewhat since the work by Orvis and Gahart. When constructing propensity categories comparable to those used by Orvis, for example, this study found that only 10 percent of the very positive propensity people ultimately enlisted compared to the 36 percent found in the Orvis study (Orvis, 1986, p.7). There were similar differences for the other propensity categories.

This study also found that while only 2 percent of the negative propensity people enlist, this negative propensity group is such a majority among 16-21 year old men (73 percent), that they constitute nearly half of all enlistments. In the Orvis study, this group accounted for 46 percent of all recruits.

This work increases the body of knowledge concerning enlistment behavior differences between various intention groups. Since all the data used in this study are available at the MEPS level, this information should be useful in aiding recruiters in their efforts to "size up" contacts and give some estimate of the potential yield of interested contacts within a local recruiting market.

Chapter II discusses the results of previous work in this area. Chapter III presents an explanation of the methodology used in this thesis. Chapter IV describes the research findings, and the conclusions and recommendations are presented in Chapter V.

II. LITERATURE REVIEW

Market research analysts have been asking people about their purchase intentions for many years. The information from these surveys has been incomplete at best because market researchers have been unable to see if potential customers actually behaved in a manner consistent with their stated intentions on the survey. The information collected from these surveys would be much more useful if researchers could determine how a respondent's stated purchase intention is related to his actual purchase behavior.

To understand the relationship between purchase intention surveys and this thesis, consider the YATS survey discussed briefly in Chapter I. This study is a key component of the Joint Market Research Program which contributes to policy formulation and development of recruiting marketing strategies (Ostrove, et.al., p.xi). By collecting both demographic data on the respondents as well as information about their interest in military service, the YATSII survey has been instrumental in the study of predicting interest and motivations in military service. It would not be counter-intuitive to suggest that if a person has a positive propensity toward enlistment then that person is more likely to enlist than one who might have a negative propensity. This relationship between propensity and enlistment behavior has become much

more important as the supply of American youth continues its decline, and competition for resources to recruit new enlistees in order to maintain prescribed force levels grows more intense. In the absence of "smarter" recruiting tools and methods born out of improved propensity information, recruiters are forced to work "harder" to find new prospects interested in the military as an employment opportunity and convert those prospects to active duty enlistments. It is important for the military services to reward superior recruiting effort, and to have a basis with which to evaluate recruiter performance. All these might be simpler to accomplished with timely, accurate estimates of enlistment probabilities within specific recruiting areas.

The most commonly cited researcher in the area of military propensity and its relationship to enlistment behavior is Bruce Orvis, who has conducted a number of studies for the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs, and Logistics. In his 1982 work, he studied this relationship using a data set wh[illegible] merged YATS survey data with military entrance records. This created the follow-up needed to compare stated enlistment intentions with actual enlistment behavior. For the first time, the actual enlistment behavior of respondents to the YATS survey could be compared to their stated enlistment intentions to study that relationship. The data suggested that "propensity to enlist" measures did a fine job of tracking actual enlistments. In

a follow-up study in 1985, Orvis and Gahart investigated the impact of propensity on the enlistment decision while controlling for the effects of various demographic factors. The results supported the hypothesis that propensity was a significant predictor of enlistment behavior and that propensity captured information about subsequent enlistment behavior not contained in background characteristics. The study also found that within intention groups, type of work, job security, and such things as educational expectations helped to distinguish those who enlisted from those who did not.

A relationship between enlistment intentions and actual enlistments behavior was also suggested by the results of a study by Nord, Schmitz and Weiland in 1986. This study also found that there was an important interaction effect between stated enlistment intentions and such factors as educational opportunities, and that labor market conditions affects the enlistment decision.

When using YATS, or YATSII as it is called in its current version, the questions used to gauge propensity are of two basic types -- aided and unaided mention. An aided mention question is one that puts the idea of military service into the respondent's thoughts by mentioning the possibility in the question. In contrast, an unaided mention question makes no mention of military service. The unaided mention questions are considered to be stronger indicators of positive interest

than unaided mention questions because of the intuitive notion that if a person responds that he is considering the military as a possibility, without that possibility being suggested, than this constitutes a greater indication of the strength of the possible enlistment choice, than would a similar response to an aided mention question where the idea was placed in the thoughts of the respondent by first being mentioned in the question. An example of an unaided mention question would be one that asks the respondent "Now, let's talk about your plans for the future. What do you think you might be doing?" Once an answer to the question is given it is followed up with the supplementary question "Anything else?" Those considering military service in any of these repeated questioning are classified as having unaided mention of military service. An example of an aided mention question that plants the idea of military service into the mind of the respondent through the question itself is one that asks "How likely is it that you will be serving in the military?" Possible answers include "definitely not", "probably not", "probably", "definitely", and "do not know".

These two types of questions allow for many possible ways to calculate propensity. In his 1982 study, Orvis used a propensity measure that was categorized as follows:

- Unaided mention and Definite aided mention.
- Unaided mention and probable aided mention.

• Definite or probable aided mention, and no unaided mention.

• Probably not, definitely not, or did not know aided mention and no unaided mention.

By his 1985 study, Orvis had combined the first two categories described above as one. Using a post-Vietnam era data set (1976-1981), he found that 36 percent of his highest propensity category people ultimately enlisted, while 15 percent of the middle propensity and 6 percent of the lowest propensity people ultimately enlisted.

This study uses a more recent data set to determine if there has been any changes to his findings and to explore the dynamics of the interaction of various demographic factors, together with propensity, on enlistment behavior.

III. DATA AND METHODOLOGY

A. DESCRIPTION OF THE DATA

Two sources of data were used in this thesis. The first was the Youth Attitude Tracking Study (YATSII). Appendix A gives a list of the YATSII questions used for the research. Question 716 asks the respondent to volunteer his social security number. Those observations that contained a SSN were matched with Military Entrance Processing Station Reporting System (MRS) files by the Defense Manpower Data Center. The MRS files contain information about many aspects of the enlistment process such as whether a person took the entrance examination, enlisted in the delayed entry program, entered active duty, or was discharged from the delayed entry program.

The data set resulting from merging these two files contained over 62,000 observations from the years 1984 through 1989. This study is limited to a sample closely resembling the primary youth market which is considered to be males, age 17-21. This thesis included 16 year olds to the sample to study their attitudes as well. After eliminating those observations for women, as well deleting those observations with important information missing, such as gender, race, and data indicating interest in the military, approximately 32,000 observations remained. This data sample was used in the

exploratory data analysis of the study. Those observations without a SSN were deleted for the regression modeling portion. About 62 percent of all respondents volunteered their SSN resulting in a sample size of approximately 20,000.

The YATSII survey is a random telephone survey that uses initial screening interview to exclude those youth that are institutionalized, like college students living in grouped quarters such as dormitories. The survey also screens out those people with prior military service as well as those in any Reserve Officer Training Corps (ROTC) programs, or those who have completed 2 years of college. Because of these screens, the survey must call over 200,000 phone numbers to determine a list of eligible people which ultimately results in approximately 10,000 interviews per year. (Ostrove, et.al., 1988, p.17)

Since YATSII began in 1975, the questions and sampling methods have changed somewhat from year to year. At first the survey was conducted every six months until the spring survey was dropped. In 1983, the YATS was combined with another survey called the Reserve Component Attitude Study (RCAS). The combination resulted in the YATSII survey which has been fairly consistent in content and form since 1984, which is the first year of data used for this study. Any rewording or coding changes to the questions used in this study were minor.

B. METHODOLOGY

The analytical portion of this thesis, which estimates the probability of joining the military service, uses multiple logistic regression techniques on a dichotomous dependent variable.

Following the discussion in Maddala (1988), suppose there is an underlying response variable, y_i^* defined by:

$$y_i^* = X_i\beta + u_i \tag{3}$$

where X_i is the vector of the independent variables for the ith observation:

$$X_i = X_{i1}, X_{i2}, \ldots, X_{ip} \tag{4}$$

and the vector of the regression parameters is denoted by

$$\beta = \beta_1, \beta_2, \ldots, \beta_p \tag{5}$$

In this model it is assumed that y_i^* is unobservable and represents a desire or taste for military service. What can be observed however is the actual enlistment, which occurs only when $y_i^* > 0$. The dummy variable representing actual enlistment is defined as:

$$y_i = 1 \text{ if } y_i^* > 0 \tag{6}$$

$$y_i = 0 \text{ otherwise} \tag{7}$$

therefore, the probability that $y_i = 1$ is given by:

$$P_i = Prob(y_i = 1) = Prob(u_i > -X_i\beta) \quad (8)$$

$$= 1 - F(-X_i\beta) \quad (9)$$

where F is the cumulative distribution of u. Since 1-F(-Z) = F(Z), the above can be rewritten as:

$$P_i = F(X_i\beta) \quad (10)$$

Since the observed y_i are just a realization of the binomial process, the likelihood function can be written as:

$$L = \prod_{y_i=1} F(X_i\beta) \prod_{y_i=0} F(-X_i\beta) \quad (11)$$

When the cumulative distribution of the error term is assumed logistic, we have the *logit* model given by:

$$F(X_i\beta) = \frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \quad (12)$$

By taking the log of both sides we get a *log-odds* ratio that is a linear function of the independent variables given by:

$$\log\left(\frac{F(X_i\beta)}{1-F(X_i\beta)}\right) = X_i\beta \quad (13)$$

therefore:

$$\log \frac{P_i}{1-P_i} = X_i\beta \qquad (14)$$

Therefore, once the coefficients of the independent variable are determined, the probability of enlistment calculated as:

$$P_i = Prob(y_i=1) = \frac{1}{1+\exp(-X_i\beta)} \qquad (15)$$

(Maddala, pp. 272-273).

Maximization of the likelihood function (equation 9) is performed by SAS version 5.18 procedure PROC LOGIST. The coefficient estimates are computed by the modified Gauss-Newton method (SAS, 1985).

IV. EMPIRICAL RESULTS

A. EXPLORATORY DATA ANALYSIS

Prior to developing an estimating equation for the enlistment behavior model, it is important to evaluate the extent to which the data mirrors the true population as it is currently understood. The evidence suggests that the YATSII survey sample is representative of the population. With respect to the RACE variable, Table 4.1 indicates that the racial proportions are similar to that of the U.S. population. This table does not separate Hispanics from other races (Hispanics are double counted). The data given in this table, as well as the rest of the tables in this study, are unweighted.

TABLE 4.1
COMPARISON OF RACE DISTRIBUTION OF SAMPLE WITH POPULATION BY PERCENTAGE

	WHITE	BLACK	HISPANIC	OTHER
SAMPLE	83.73	12.34	8.11	3.92
POPULATION*	83.30	12.30	8.10	3.40

* Source: U.S. Department of Commerce, Bureau of the Census. Persons of hispanic origin may be of any race.

Because of the increasing attention given to recruiting people of Hispanic background, Hispanics were broken out from other races for the purpose of this study. For instance, those

people who stated they were both Black and Hispanic were considered Hispanic for the study. Table 4.2 shows the distribution of the sample by RACE, with Hispanics separated from other races, for those respondents who gave their SSN. YATSII question Q715 ("Are you of Hispanic background?") was used to determine which respondents are of Hispanic background. Those who answered "yes" were considered Hispanic for the study. Whites comprised 73 percent of the Hispanic sample with Blacks and Others comprising 8 percent and 18 percent respectively. One possible reason for the seemingly high ratio of people of Hispanic background coming from the Other category is that this category include groups such as Filipinos and American Indians whose ancestors had a period of Spanish rule.

TABLE 4.2
PERCENTAGE DISTRIBUTION OF SAMPLE BY RACE
WITH HISPANICS SEPARATED FROM OTHER RACES

	WHITE	BLACK	HISPANIC	OTHER
SAMPLE PERCENT	77.59	11.43	8.09	2.89

Those survey respondents who gave their SSN were matched with DOD records to determine enlistment behavior. Those people who did not volunteer their SSN where dropped from the sample. Approximately 63 percent of the survey respondents volunteered their SSN's. This may be a source of bias, in

TABLE 4.3
SOCIAL SECURITY NUMBER BY AGE

FREQUENCY PERCENT ROW PCT COL PCT	AGE 16	17	18	19	20	21	TOTAL
SSN GIVEN	3741 11.81 18.81 50.13	4574 14.44 22.99 59.16	4093 12.92 20.58 70.04	3248 10.25 16.33 71.10	2339 7.38 11.76 71.27	1898 5.99 9.54 68.15	19893 62.81
SSN GIVEN	3721 11.75 31.59 49.87	3158 9.97 26.81 40.84	1751 5.53 14.86 29.96	1320 4.17 11.21 28.90	943 2.98 8.01 28.73	887 2.80 7.53 31.85	11780 37.19
TOTAL	7462 23.56	7732 24.41	5844 18.45	4568 14.42	3282 10.36	2785 8.79	31673 100.00

Pearson Chi-square statistic 957.14 (P=0.00)

that those who did not give their SSN are not representative of the population as a whole. Table 4.3 compares the distribution of respondents by age of those who gave their SSN with those who did not by age. Those who did not volunteer their SSN tended to be younger. While 16 and 17 year olds make up nearly 48 percent of the overall sample, these two age groups make up only 42 percent of those who volunteered their SSN. In effect, dropping those observations which did not include a SSN variable forces this study to undersample the younger age groups and oversample those who are older. Tables 4.4 through 4.8 continue this comparison over other sociodemographic variables used in this study. Table 4.4 shows that those who give their SSN's have a slightly more positive propensity[7] towards military service than those that do not.

Table 4.5 illustrates the difference between those who give their SSN and those who do not for various educational achievement groups[8]. Those in high school were less likely to provide a SSN and may therefore be underrepresented in the sample. One explaination for this may be the limited work experience of this group. This problem may have less impact on studies in later years due to the recent requirement that

[7] See page 27 for a discussion of the propensity category and its formulation.

[8] See Table 4.14 for an explanation of abbreviations used for educational status.

TABLE 4.4
SOCIAL SECURITY NUMBER BY PROPENSITY

FREQUENCY PERCENT ROW PCT COL PCT	VERY POSITIVE	POSITIVE	NEGATIVE	TOTAL
SSN GIVEN	1725 5.45 8.67 67.70	3570 11.27 17.95 64.79	14596 46.09 73.38 61.83	19891 62.82
SSN NOT GIVEN	823 2.60 6.99 32.30	1940 6.13 16.48 35.21	9012 28.46 76.54 38.17	11775 37.18
TOTAL	2548 8.05	5510 17.40	23608 74.55	31666 100.00

Pearson Chi-square statistic 45.12 (P=0.00)

TABLE 4.5
SOCIAL SECURITY NUMBER BY EDUCATIONAL STATUS

FREQUENCY PERCENT ROW PCT COL PCT	HSEQUIV	HSDG	SOMCOL	IN HS	OTHER	TOTAL
SSN GIVEN	148 0.47 0.74 75.13	3640 11.49 18.30 67.90	5524 17.44 27.77 71.49	7606 24.01 38.23 55.60	2975 9.39 14.96 63.18	19893 62.81
SSN NOT GIVEN	49 0.15 0.42 24.87	1721 5.43 14.61 32.10	2203 6.96 18.70 28.51	6073 19.17 51.55 44.40	1734 5.47 14.72 36.82	11780 37.19
TOTAL	197 0.62	5361 16.93	7727 24.40	13679 43.19	4709 14.87	31673 100.00

Pearson Chi-square statistic 625.78 (P=0.00)

parents get SSN's for their children by the age of five for income tax reporting purposes. Even so, new tax regulations

will not guarantee that younger respondents will remember their SSN.

TABLE 4.6
SOCIAL SECURITY NUMBER BY RACE

FREQUENCY PERCENT ROW PCT COL PCT	BLACK	HISPANIC	WHITE	OTHER	TOTAL
SSN GIVEN	2274 7.18 11.43 63.57	1610 5.08 8.09 57.36	15434 48.73 77.59 63.47	575 1.82 2.89 59.22	19893 62.81
SSN NOT GIVEN	1303 4.11 11.06 36.43	1197 3.78 10.16 42.64	8884 28.05 75.42 36.53	396 1.25 3.36 40.78	11780 37.19
TOTAL	3577 11.29	2807 8.86	24318 76.78	971 3.07	31673 100.00

Pearson Chi-square statistic 46.49 (P=0.00)

Table 4.6 shows that Blacks and Whites were slightly more likely to give their SSN's and that Hispanics, along with those classified in the Other group, were slightly less likely to volunteer their SSN. Table 4.7 shows that there was no significant difference between those who gave their SSN and those who did not when the sample was classified by the respondent's perceived difficulty in finding full-time employment. Those who had a friend or relative join the military recently were more likely to volunteer their SSN's. This is illustrated in Table 4.8. Exploring the differences between those who gave their SSN and those who chose to not

TABLE 4.7
SOCIAL SECURITY NUMBER BY PERCEIVED FULL-TIME EMPLOYMENT SEARCH DIFFICULTY

FREQUENCY PERCENT ROW PCT COL PCT	VERY HARD	HARD	EASY	TOTAL
SSN GIVEN	5924 18.70 29.78 62.28	8560 27.03 43.03 62.97	5409 17.08 27.19 63.14	19893 62.81
SSN NOT GIVEN	3588 11.33 30.46 37.72	5034 15.89 42.73 37.03	3158 9.97 26.81 36.86	11780 37.19
TOTAL	9512 30.03	13594 42.92	8567 27.05	31673 100.00

Pearson Chi-square statistic 1.69 (P=0.43)

give a SSN provides useful information in the understanding of the composition of the sample and sources of potential bias in the study. However, the underlying question must be whether those two groups behave differently with regard to the decision to enlist. Since it is not possible to determine this, this study assumes that they are at least very similar in their enlistment behavior.

DOD records that were matched successfully with YATSII survey observations were classified as shown in Table 4.9. Only those records classified as type 3 were considered JOINERS for the study. Other record types, like those taking the entrance exam or joining the Delayed Entry Program (DEP), were not included because this study considers a successful recruiting effort as one which results in a person going on

TABLE 4.8
SOCIAL SECURITY NUMBER BY FRIEND OR RELATIVE JOINING

FREQUENCY PERCENT ROW PCT COL PCT	NO	YES	TOTAL
SSN GIVEN	10943 34.55 55.01 59.47	8950 28.26 44.99 67.44	19893 62.81
SSN NOT GIVEN	7459 23.55 63.32 40.53	4321 13.64 36.68 32.56	11780 37.19
TOTAL	18402 58.10	13271 41.90	31673 100.00

Pearson Chi-square statistic 209.87 (P=0.00)

TABLE 4.9
YATSII TO DOD MATCH CLASSIFICATIONS

TYPE	MEANING
1	RECORD SHOWING ENTRANCE EXAMINATION RESULTS ONLY
2	RECORD SHOWING ENLISTMENT INTO DELAYED ENTRY PROGRAM
3	RECORD SHOWING ENLISTMENT INTO ACTIVE DUTY STATUS
4	RECORD SHOWING DISCHARGE FROM THE DELAYED ENTRY PROGRAM

active duty.

Also of interest was the distribution of RACE over the two enlistment categories. Table 4.10 gives these results. While it is shown that NONJOINERS are distributed by race in a

manner representative of the population, it is readily apparent that JOINERS are not. Blacks represented 11.43 percent of the sample, yet Blacks comprised 16.5 percent of the JOINERS. American Indians, Asian and Pacific Islanders and others --this entire group classified as "Other"-- enlist at a rate significantly less than their sample population percentage (1.63 percent enlist versus 2.89 sample percentage).

TABLE 4.10
PERCENTAGE DISTRIBUTION OF RACE
BY ENLISTMENT BEHAVIOR

FREQUENCY PERCENT ROW PCT COL PCT	WHITE	BLACK	HISPANIC	OTHER	TOTAL
JOINER	453	101	48	10	612
	2.28	0.51	0.24	0.05	3.08
	74.02	16.50	7.84	1.63	
	2.94	4.44	2.98	1.74	
NONJOINER	14981	2173	1562	565	19281
	75.31	10.92	7.85	2.84	96.92
	77.70	11.27	8.10	2.93	
	97.06	95.56	97.02	98.26	
TOTAL	15434	2274	1610	575	19893
	77.59	11.43	8.09	2.89	100.00

Pearson Chi-square statistic 18.74 (P=0.00)

It is also interesting to look at what percentage of each race in the sample actually decided to join. Table 4.10 clearly illustrates that enlistment in the active duty military is a relatively rare event with only 3.08 percent of the 16 to 21 year old males deciding to join. It is also

apparent that Blacks enlist at a much higher rate than Whites, 4.44 percent versus 2.94 percent, while Whites and Hispanics enlist at much higher rate than Others, about 3 percent versus 1.74 percent. These differences are statistically significant at the 5 percent level. A 95 percent confidence interval for the enlistment proportion by race may be calculated as:

$$\hat{p} \pm z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \qquad (16)$$

for

$$n\hat{p} > 5, n(1-\hat{p}) > 5 \qquad (17)$$

This normal approximation of the binomial probability of enlisting is acceptable for samples sizes greater than 30 (Kazmier 1988, p.146). Table 4.11 gives 95 percent confidence intervals for the proportion of each racial category who join the service. The Hispanic confidence interval has some overlap with that of Blacks, while the "Other" category confidence interval has some overlap with Hispanics. The higher enlistment rate for Blacks in the sample is consistent with the finding that Blacks constitute a greater proportion of the JOINERS than their proportion of the population as a whole.

In addition to exploring the distribution of JOINERS and NONJOINERS, it is important to understand the distribution of propensity with respect to race and other factors because propensity has been shown to influence the enlistment

TABLE 4.11
95 PERCENT CONFIDENCE INTERVALS
FOR THE PROPORTION OF THOSE WHO JOINED FROM EACH RACE

RACE	CONFIDENCE INTERVAL
WHITE	[2.7 , 3.2]
BLACKS	[3.6 , 5.3]
HISPANICS	[2.1 , 3.8]
OTHERS	[0.1 , 2.8]

decision. The YATSII survey uses both aided and unaided mention questions to determine enlistment attitudes. This study uses YATSII survey question Q503 and composite variable V438JOIN in formulating a propensity for military service variable. Composite variable V438JOIN is an unaided responses variable indicating that a military service response was given without being first mentioned. This composite variable was created from questions Q438A through Q438E. Those who mentioned the military service in any of these repeated questioning are classified as having an unaided mention of military service. Question Q503 is an aided mention question which asks respondents "How likely is it that you will be serving in the military?" Those answering either "definitely" or "probably" are said to have had a positive aided mention, while those answering "probably not", "definitely not", and "do not know" are considered to have negative aided mention. Using these two YATSII variables, a propensity measure was created with the three categories described in Table 4.12.

This grouping was created in order to separate the stronger responses from the weaker ones.

TABLE 4.12
PROPENSITY CATEGORIES

CATEGORY	DESCRIPTION
VERY POSITIVE	Both positive unaided and positive aided mention.
POSITIVE	Only positive aided mention.
NEGATIVE	Only negative aided mention.

TABLE 4.13
EDUCATIONAL STATUS CLASSIFICATION

STATUS	DESCRIPTION
HSEQUIV	Adult Basic Education Certificate (ABE), General Education Development (GED), or some other high school equivalency certificate
HSDG	High school degree graduate
IN HS	In regular day high school
SOMCOL	Respondents having some college credit
OTHER	All others

Educational status was classified as shown in Table 4.13. Table 4.14 displays the distribution of propensity by educational status. With the exception of the "OTHER" category, as educational achievement increases, the proportion of respondents within either of the positive propensity

TABLE 4.14
PERCENTAGE DISTRIBUTION OF EDUCATIONAL STATUS BY PROPENSITY

FREQUENCY / PERCENT / ROW PCT / COL PCT	HSEQUIV	HSDG	SOMCOL	IN HS	OTHER	TOTAL
VERY POSITIVE	8	208	119	1081	309	1725
	0.04	1.05	0.60	5.43	1.55	8.67
	0.46	12.06	6.90	62.67	17.91	
	5.41	5.71	2.15	14.22	10.39	
POSITIVE	24	478	499	1825	744	3570
	0.12	2.40	2.51	9.18	3.74	37.19
	0.67	13.39	13.98	51.12	20.84	
	16.22	13.13	9.03	24.00	25.01	
NEGATIVE	116	2954	4906	4698	1922	14596
	0.58	14.85	24.66	23.62	9.66	73.38
	0.79	20.24	33.61	32.19	13.17	
	78.38	81.15	88.81	61.78	64.61	
TOTAL	148	3640	5524	7604	2975	19891
	0.74	18.30	27.77	38.23	14.96	100.00

Pearson Chi-square statistic 1498.80 (P=0.00)

categories decreases. People still in high school are seven times more likely to have a very positive propensity than people with some college (14.22 percent versus 2.15 percent). Those respondents with either high school equivalency certificates or actual diplomas are more than twice as likely to be in the very positive propensity category than those with some college (about 5.5 percent versus 2.15 percent). The pattern holds within the positive category as well, although the differences between the rates diminish somewhat. It should be kept in mind that this pattern may be influenced by any number of confounding variables such as the respondents

age or the number of times he might have been contacted by recruiters. For instance, it is possible that younger high school diploma graduates are causing the proportion in the very positive propensity category to seem higher, simply because younger people are more likely to have a positive attitude toward military service as shown in Table 4.15.

It is also interesting to note that while 73 percent of the 16 to 21 year old men in the sample state a negative propensity toward military service, this percentage would be higher had it not been for the relatively more positive attitude of those still in high school and those in the "other" category -- dropouts and those attending vocational school.

It should also be pointed out, however, that nearly half (45 percent) of all respondents in the negative propensity category come from either the "other" group or those still in high school. This is primarily due to the large percentage of respondents in the those two categories. As noted earlier, the negative propensity group made up nearly half of all JOINERS and a small change in this propensity could greatly increase the recruiting pool. The results in Table 4.15 suggest that those in high school represent the greatest proportion of very positive propensity men. This group also represents the lowest proportion of negative propensity men. High school men are a source of enlistees whose location and size can be easily determined. No one can deny the extent

TABLE 4.15
PERCENTAGE DISTRIBUTION OF PROPENSITY BY AGE

FREQUENCY PERCENT ROW PCT COL PCT	AGE 16	17	18	19	20	21	TOTAL
VERY POS-ITIVE	511 2.57 29.62 13.66	579 2.91 33.57 12.66	336 1.69 19.48 8.21	158 0.79 9.16 4.86	90 0.45 5.22 3.85	51 0.26 2.96 2.69	1725 8.67
POS-ITIVE	977 4.91 27.37 26.12	995 5.00 27.87 21.76	663 3.33 18.57 16.20	421 2.12 11.79 12.96	305 1.53 8.54 13.04	209 1.05 5.85 11.01	3570 17.95
NEG-ATIVE	2252 11.32 15.43 60.21	2999 15.08 20.55 65.58	3094 15.55 21.20 75.59	2669 13.42 18.29 82.17	1944 9.77 13.32 83.11	1638 8.23 11.22 86.30	14596 73.38
TOTAL	3740 23.56	4573 24.41	4093 18.45	3248 14.42	2339 10.36	1898 8.79	19891 100.00

Pearson Chi-square statistic 934.92 (P=0.00)

with which peer pressure can influence the decisions and attitudes of this group. Programs designed to influence young men away from the negative propensity category should be targeted primarily to those in high school.

The ability to find alternative work is often cited as a factor in the enlistment decision, but its impact on stated propensity is not clearly understood. YATSII survey question Q436 asks respondents about the difficulty of finding full-time work. Those answering "almost impossible" and "very difficult" were classified as anticipating a very hard time finding full-time employment. Those answering "somewhat difficult" were classified as having a hard time, while those answering "not difficult at all" were classified as anticipating an easy time finding full-time employment. Table 4.16 shows the distribution of stated job availability by propensity. It should be noted that the data set used for this study is from the years 1984 through 1989 and is part of one of the longest periods of economic growth in U.S. history. Despite this, nearly 73 percent of the respondents stated that finding full-time work was either very hard or hard.

As expected, an increased difficulty in finding full-time work is related to increased propensity for military service. But does this perceived job search difficulty equate to increased enlistment probability? Table 4.17 shows the distribution of stated job search difficulty with respect to enlistment behavior. The results confirm that a respondent is

TABLE 4.16
PERCENTAGE DISTRIBUTION OF STATED
FULL-TIME JOB FINDING DIFFICULTY BY PROPENSITY

FREQUENCY PERCENT ROW PCT COL PCT	VERY HARD	HARD	EASY	TOTAL
VERY POSITIVE	653 3.28 37.86 11.02	714 3.59 41.39 8.34	358 1.80 20.75 6.62	1725 8.67
POSITIVE	1219 6.13 34.15 20.58	1537 7.73 43.05 17.96	814 4.09 22.80 15.05	3570 17.95
NEGATIVE	4051 20.37 27.75 68.39	6308 31.71 43.22 73.70	4237 21.30 29.03 78.33	14596 73.38
TOTAL	5923 29.78	8559 43.03	5409 27.19	19891 100.00

Pearson Chi-square statistic 151.646 (P=0.00)

more likely to join as the perceived difficulty of finding full-time work increases. The data indicate that nearly 80 percent of those who joined the service fell into either the "very hard" or "hard" job search categories. Calculated confidence intervals at an alpha level of .05 for the proportion of JOINERS who stated a very hard time finding full-time work is [2.9 , 3.8], which is nearly the same as those stating a hard time [2.9 , 3.7]. The confidence interval for the proportion of joiners stating an easy job search is [1.9 , 2.7]. If stated difficulty is positively

TABLE 4.17
PERCENTAGE DISTRIBUTION OF STATED FULL-TIME JOB FINDING DIFFICULTY BY ENLISTMENT BEHAVIOR

FREQUENCY PERCENT ROW PCT COL PCT	VERY HARD	HARD	EASY	TOTAL
JOINER	200	287	125	612
	1.01	1.44	0.63	3.08
	32.68	46.90	20.42	
	3.38	3.35	2.31	
NONJOINER	5724	8273	5284	19281
	28.77	41.59	26.56	96.92
	29.69	42.91	27.41	
	96.62	96.65	97.69	
TOTAL	5924	8560	5409	19893
	29.78	43.03	27.19	100.00
Pearson Chi-square statistic		14.60	(P=0.01)	

related to actual difficulty, recruiting could become more difficult if the country were to experience an economic period where most people thought it was *easy* to find full-time work.

Tables 4.18 and 4.19 are the cross-tabulation results for stated difficulty in finding a part-time job (YATSII question Q437). The distribution of job finding difficulty to enlistment propensity for part-time work is very similar to that of full-time job finding. Again, as the part-time job search becomes more difficult, respondents are more likely to have a positive propensity toward military service.

However, as shown in Table 4.19, increased difficulty in finding part-time employment does not equate to increased enlistments as was the case for full-time job search

TABLE 4.18
PERCENTAGE DISTRIBUTION OF STATED
PART-TIME JOB FINDING DIFFICULTY BY PROPENSITY

FREQUENCY PERCENT ROW PCT COL PCT	VERY HARD	HARD	EASY	TOTAL
VERY POSITIVE	225	491	1011	1727
	1.13	2.46	5.07	8.66
	13.03	28.43	58.54	
	11.30	9.13	8.04	
POSITIVE	475	1050	2055	3580
	2.38	5.27	10.31	17.95
	13.27	29.33	57.40	
	23.85	19.52	16.35	
NEGATIVE	1292	3839	9502	14633
	6.48	19.25	47.65	73.39
	8.83	26.24	64.94	
	64.86	71.36	75.60	
TOTAL	1992	5380	12568	19940
	9.99	26.98	63.03	100.00

Pearson Chi-square statistic 117.82 (P=0.00)

perceptions. As this table shows, nearly 60 percent of those who chose to enlist, perceived that it was not difficult to find part-time work. Another notable difference between the data for part-time and full-time job search is that, as mentioned earlier, 73 percent of the respondents said that finding a full-time job was very hard or hard, while 63 percent perceived the part-time job search as easy. The Pearson correlation coefficient between the difficulty in finding full-time work and that of part-time work was .422. A correlation coefficient of zero suggests that neither variable varies with other, while a coefficient of 1 or -1

TABLE 4.19
PERCENTAGE DISTRIBUTION OF STATED PART-TIME JOB FINDING DIFFICULTY BY ENLISTMENT BEHAVIOR

FREQUENCY PERCENT ROW PCT COL PCT	VERY HARD	HARD	EASY	TOTAL
JOINER	51 0.26 8.28 2.56	197 0.99 31.99 3.66	368 1.85 59.74 2.93	616 3.09
NONJOINER	1942 9.74 10.05 97.44	5183 25.99 26.82 96.34	12201 61.18 63.13 97.07	19326 96.91
TOTAL	1993 9.99	5380 26.98	12569 63.03	19942 100.00

Pearson Chi-square statistic 8.86 (P=0.01)

suggests a perfect positive or negative linear relationship (SAS, 1985).

Friends and families are very strong social groups that have a large impact on the actions of their members. YATSII question Q682 asks the respondent if a good friend or relative has enlisted in the military within the last six months. The task is to determine whether this event is related to enlistment behavior. As shown in Table 4.20, nearly half of the people in the sample (45 percent) said they knew a friend or relative who had enlisted in the last six months. The results show that an association with a friend or relative who signed up in the military does vary with stated intentions toward the service. Table 4.21 is the cross-tabulation

TABLE 4.20
PERCENTAGE DISTRIBUTION OF FRIEND OR RELATIVE JOINING BY PROPENSITY

FREQUENCY / PERCENT / ROW PCT / COL PCT	"FRIEND OR RELATIVE JOIN? YES	NO	TOTAL
VERY POSITIVE	923	802	1725
	4.64	4.03	8.67
	53.51	46.49	
	10.31	7.33	
POSITIVE	1701	1869	3570
	8.55	9.40	17.95
	47.65	52.35	
	19.01	17.08	
NEGATIVE	6326	8270	14596
	31.80	41.34	73.38
	43.34	56.66	
	70.68	75.59	
TOTAL	8950	10941	19891
	45.00	55.00	100.00
Pearson Chi-square statistic		76.79	(P=0.00)

results between whether a friend or relative joined the service recently and enlistment behavior. The data suggest that a person was slightly more likely to have had a more positive propensity toward military service if a friend or relative had joined. The data also suggest that the entrance of a person to the active duty military is a familiar event to nearly half the sample (45 percent). Those who had had a friend or relative enlist also entered the service at a rate 9 percent higher than those who did not. This may be a function of similar socio-economic backgrounds among friends and relatives rather than a result of the influence that a friend or relative has on the enlistment decision of others.

TABLE 4.21
PERCENTAGE DISTRIBUTION OF JOINING BY FRIEND OR RELATIVE JOINING

FREQUENCY / PERCENT / ROW PCT / COL PCT	"FRIEND OR RELATIVE JOIN?" YES	NO	TOTAL
JOINERS	326	286	612
	1.64	1.44	3.08
	53.27	46.73	
	3.64	2.61	
NONJOINERS	8624	10657	19281
	43.35	53.57	96.92
	44.73	55.27	
	96.39	97.39	
TOTAL	8950	10943	19893
	44.99	55.01	100.00

Pearson Chi-square statistic 17.48 (P=0.00)

An attempt to explore the socio-economic status of the respondents was made using YATSII questions Q713F and Q713M which ask the respondent about the educational achievements of his mother and father respectively. The hypothesis was that those respondents whose parents have higher education would have greater exposure to the benefits of higher education. Assuming this exposure is positive, these respondents may have a weaker propensity toward military service than those whose parents did not have higher education. Unfortunately, this question was not added to the YATSII survey until 1986 and therefore was not used in this study. One alternative to parent's education in determining college track respondents was the use of YATSII questions which ask what mathematics

courses were taken in high school. It is hypothesized that those individuals who take upper level math courses are more likely to be on a college track and therefore have a lower propensity towards military service. Table 4.22 shows that those who take an intermediate level math course (Algebra II) are less likely to have a very positive or positive propensity toward military service than those who do not. However, a comparison of the 95 percent confidence intervals for the proportion of those who took Algebra II and joined the service (1.5 , 4.1), and that of those who did not take Algebra II and joined the service (2.0 , 4.9), reveals that the difference between these two proportions shown in Table 4.23 is not statistically significant.

Table 4.24 gives the distribution of enlistment behavior by propensity. The results show that large majority of the sample respondents stated a negative propensity for military service. One can see that very positive propensity men enlist at far greater rates than those of positive propensity men, 9.8 percent compared to 3.7 percent, and enlist at almost 5 times the rate of negative propensity men.

Another interesting finding is the extent to which the negative propensity men enlisted. Nearly half (50.2 percent) of all enlistments came from this propensity group. While only two percent of the negative propensity group ultimately enlisted, this group was so large -- representing 73.4 percent of the 16 to 21 year old men -- that it becomes as large a

TABLE 4.22
DISTRIBUTION OF MATH LEVEL (ALGEBRA II TAKEN)
BY ENLISTMENT PROPENSITY

FREQUENCY PERCENT ROW PCT COL PCT	ALGEBRA II TAKEN NO	 YES	 TOTAL
VERY POSITIVE	1038 5.22 60.17 11.28	687 3.45 39.83 6.43	1725 8.67
POSITIVE	2043 10.27 57.23 22.21	1527 7.68 42.77 14.28	3570 17.95
NEGATIVE	6118 30.76 41.92 66.51	8478 42.62 58.08 79.29	14596 73.38
TOTAL	9199 46.25	10692 53.75	19891 100.00

Pearson Chi-square statistic 417.88 (P=0.00)

fraction of the total enlistments as both very positive and positive propensity men combined. This suggests that small changes in the percentage of negative propensity men can have dramatic effects on enlistments and is similar to the findings by Orvis (1986).

Table 4.25 shows the distribution of propensity by race. The data suggest that Blacks fall into the very positive propensity category at nearly three times the rate of Whites and nearly twice the rate of Hispanics or Others. Blacks also show a positive propensity toward enlistment at about twice the rate of Whites.

TABLE 4.23
DISTRIBUTION OF MATH LEVEL (ALGEBRA II TAKEN)
BY ENLISTMENT BEHAVIOR

FREQUENCY PERCENT ROW PCT COL PCT	ALGEBRA II TAKEN NO	 YES	 TOTAL
JOINER	315 1.58 51.47 3.42	297 1.49 48.53 2.78	612 3.08
NONJOINER	8886 44.67 46.09 96.58	10395 52.25 53.91 97.22	19281 96.92
TOTAL	9201 46.25	10692 53.75	19893 100.00

Pearson Chi-square statistic 6.92 (P=0.01)

The conversion rate, or ratio of propensity to actual enlistment, for the very positive propensity men is given in Table 4.24 is nearly 10 percent and is more conservative than that given by Orvis (1986). He found that 36 percent of very positive propensity men ultimately enlist. The VERY POSITIVE variable used in this study is defined similarly to Orvis' highest propensity category. A possible reason for this difference is in the time periods of the data used for the studies. Orvis used post-Vietnam data from the years 1976-1984. One could argue that the low opinion of the military held by many of the nation's youth during the years immediately following the war suggests that those who answered positively to aided and unaided mention questions concerning the prospect of future military service were much more likely

TABLE 4.24
PERCENTAGE DISTRIBUTION OF ENLISTMENT BEHAVIOR BY PROPENSITY

FREQUENCY / PERCENT / ROW PCT / COL PCT	VERY POSITIVE	POSITIVE	NEGATIVE	TOTAL
JOINER	171	132	309	612
	0.86	0.66	1.55	3.08
	27.94	21.57	50.49	
	9.91	3.70	2.12	
NONJOINER	1554	3438	14287	19279
	7.81	17.28	71.83	96.92
	8.06	17.83	74.11	
	90.09	96.30	97.88	
TOTAL	1725	3570	14596	19891
	8.67	17.95	73.38	100.00

Pearson Chi-square statistic 320.03 (P=0.00)

to join if they possessed enough conviction to state an intention at such variance with public opinion.

To summarize the results of the exploratory analysis, it is assumed that the sample used in this thesis is representative of the population being studied. Although there may be some bias introduced to the study by throwing out the observations of those survey respondents who chose not to give their SSN, there is no way to determine if their enlistment behavior is any different from those who chose to give their SSN. The results of the cross-tabulations suggest that those who provide a SSN are more likely to be older, not in high school, have a more positive propensity toward serving in the military, and more likely to have had a friend or relative join the service recently. It has been shown that

TABLE 4.25
PERCENTAGE DISTRIBUTION OF PROPENSITY
BY RACE

FREQUENCY PERCENT ROW PCT COL PCT	WHITE	BLACK	HISPANIC	OTHER	TOTAL
VERY POSITIVE	1062 5.34 61.57 6.88	440 2.21 25.51 19.35	176 0.88 10.20 10.93	4 0.24 2.72 8.17	1725 8.67
POSITIVE	2352 11.82 65.88 15.24	672 3.38 18.82 29.55	407 2.05 11.40 25.28	139 0.70 3.89 24.17	3570 17.95
NEGATIVE	12018 60.42 82.34 77.88	1162 5.84 7.96 51.10	1027 5.16 7.04 63.79	389 1.96 2.67 67.65	14596 73.38
TOTAL	15432 77.58	2274 11.43	1610 8.09	575 2.89	19891 100.00
Pearson Chi-square statistic			878.96	(P=0.00)	

blacks are overrepresented in the military, and that perhaps this is due to the more positive propensity toward military service of this race category compared to the others. The data indicate that there is a positive relationship between the propensity measure used in this study and enlistment behavior. This suggests that as propensity toward military service increases, so too does the likelihood of enlistment for that individual. It was also shown that younger men and those still in high school had the highest propensity, and that nearly 80 percent of those who had joined the service during the period from which the data was collected, 1984-1989, perceived that full-time employment was hard or vary

hard to find, despite the fact that this period covers one of the longest economic expansion in U.S. history.

While there is much useful information to be gleaned from an analysis of cross tables as has been done here, this type of analysis cannot include the effect of confounding variables. It is the influence and interaction of the factors that effect the enlistment decision that is of most use when trying to model such behavior. This can be accomplished through multivariate regression equation modeling.

B. BEHAVIORAL MODELING

A model was developed to predict the probability of joining the military service based on stated intentions and various demographic characteristics as follows: Joining = *f*(propensity, age, friend or relative joining, math level taken, educational status, job availability).

The dependent variable is a dichotomous variable representing the actual enlistment behavior of the YATSII respondent. Those who enlisted (positive outcome) were called JOINERS and were coded as a "one". NON-JOINERS were coded as a "zero".

Independent variables were chosen on the basis of previous research findings such as those discussed in Chapter II that suggest a relationship between the particular factors and the enlistment decision. Variables representing factors known to affect the supply of labor, such as perceived difficulty in

finding full-time employment, and the availability of data were also considerations for choosing the independent variables for the model. Table 4.26 shows the coding for the independent variables used in the model. The variable EMPOPP was derived from the full-time job search question (Q436) rather than the part-time question (Q437) because it is believed that military service is more a substitute for full-time work than part-time. Various measures of propensity are available from the YATSII survey. The constructed propensity measure used in this study is similar to that used by Orvis (1986). Other measures were examined for use, but they did not increase the explanatory power of the model.

The LOGIST procedure of SAS version 5.18 was used to conduct this part of the analysis. This procedure fits a logistic multiple regression model to a dichotomous dependent variable. Coefficient estimates, standard errors, chi-square statistics for significance at an alpha level of .05, and the probability that a coefficient is not significantly different from zero are given in Table 4.27.

The variables representing propensity, age, status, and whether a friend or relative had joined recently were all significant at an alpha level of .05. The job finding difficulty variable was significant at an alpha level of .1, while the math level and race variables were not significantly different from zero at an alpha level of .05. The insignificance of the race variables is of particular

TABLE 4.26
INDEPENDENT VARIABLE CODING

VARIABLE	CODING
PROPENSITY	1 = BOTH POSITIVE AIDED AND POSITIVE UNAIDED MENTION 2 = POSITIVE AIDED MENTION ONLY 3 = NEGATIVE AIDED MENTION ONLY
AGE	INTEGER VALUES 16 THROUGH 21
JOINASOC	1 = FRIEND OR RELATIVE JOINED 0 = OTHERWISE
BLACK	1 = OF BLACK RACE 0 = OTHERWISE
HISP	1 = OF HISPANIC BACKGROUND 0 = OTHERWISE
OTHER	1 = ALL RACES NOT WHITE, BLACK OR OF HISPANIC BACKGROUND 0 = OTHERWISE
EDSTAT	1 = HIGH SCHOOL EQUIVALENCY GRADUATE (HSEQUIV) 2 = HIGH SCHOOL DIPLOMA GRADUATE (HSDG) 3 = SOME COLLEGE (SOMCOL) 4 = IN HIGH SCHOOL 5 = OTHER
EMPOPP	1 = ALMOST IMPOSSIBLE OR VERY DIFFICULT 2 = SOMEWHAT DIFFICULT 3 = NOT DIFFICULT AT ALL
MATHLEV	1 = ALGEBRA II TAKEN 0 = OTHERWISE

interest, since this has always been shown to one of the more significant factors in studies that attempted to predict propensity toward military service. One possible explanation is that the propensity measure used in the model is soaking up

TABLE 4.27
REGRESSION RESULTS

VARIABLE	COEFFICIENT	STD. ERR.	CHI-SQ.	P
INTERCEPT	0.95	0.70	1.82	0.17
PROPENSITY	-0.74	0.05	186.5	0.00
AGE	-0.12	0.03	12.5	0.00
JOINASOC	0.25	0.08	8.0	0.00
BLACK	0.04	0.12	0.1	0.72
HISP	-0.14	0.15	0.9	0.35
OTHER	-0.64	0.32	3.9	0.05
EDSTAT	-0.10	0.05	4.1	0.04
EMPOPP	-0.10	0.06	3.0	0.08
MATHLEV	-0.05	0.08	0.4	0.53
Model Chi-square= 254.48		-2 Log Likelihood= 5211.65		

most of the effects of race -- and math level as well. One might suspect an interaction effect between the propensity variable and such variables as race, education status, and age, but the results from models with these interaction variables included showed that one could not reject the hypothesis that the coefficients of those effects were not significantly different from zero. Another way to determine whether the propensity variable is significantly different from zero is the Likelihood Ratio (LR) test. This test is similar to an F-test and is calculated as:

$$LR = n*\ln\left(\frac{RRSS}{URSS}\right) \quad (18)$$

where RRSS is the restricted model residual sum of squares and URSS is the unrestricted model sum of squares (Maddala, 1988 p.137). When the natural log of the likelihood ratio statistic is multiplied by -2, this value is distributed Chi-square with degrees of freedom equal to the number of restrictions to the model being tested. Table 4.28 gives the results of the restricted model (without the propensity variable) for use in the test. The test statistic is more easily calculated by subtracting the -2 log likelihood figure of the unrestricted model from that of the restricted model as follows:

$$(-2\ln LR(RESTRICTED)) - (-2LN\ LR(UNRESTRICTED)) > X^2_{1df} \quad (19)$$

The results show that one could reject the hypothesis that PROPENSITY is not significantly different from zero, since 5383.12 - 5211.65 > 3.84 (Chi-square at an alpha level of .05).

The coefficients from the unrestricted model, Table 4.27, do not run counter to what was expected after examining the exploratory data results, except for the insignificance of the race variable which has always been shown as significant in all the literature reviewed for this study. The coefficients suggested that the probability of joining decreases as the

respondents get older, and obtain higher levels of educational status. Also, as perceived difficulty of finding full-time employment decreases, the probability of joining the service decreases.

TABLE 4.28
RESTRICTED MODEL REGRESSION RESULTS

VARIABLE	COEFFICIENT	STD. ERR.	CHI-SQ.	P
INTERCEPT	0.08	0.71	0.0	0.90
AGE	-0.18	0.03	30.0	0.00
JOINASOC	0.31	0.08	14.3	0.00
BLACK	0.33	0.11	8.9	0.00
HISP	-0.01	0.15	0.0	0.96
OTHER	-0.54	0.32	2.8	0.09
EDSTAT	-0.04	0.05	0.8	0.38
EMPOPP	-0.13	0.05	5.9	0.02
MATHLEV	-0.19	0.08	5.4	0.02
Model Chi-square= 83.14		-2 Log Likelihood= 5383.12		

Table 4.29 gives the model prediction which was 73.2 percent correct. A predicted probability of .03 was used to determine a positive outcome since this is the proportion of 16 to 21 year old men who join the service. The model correctly predicted 50 percent of the JOINERS, with a false negative rate of only 2.1 percent. This makes the model quite useful in predicting the true NONJOINER. That is to say, given some predicted level of interest, this model could eliminate the use of 73.9 percent of recruiting resources that

TABLE 4.29
MODEL PREDICTION RESULTS

		PREDICTED		
		NONJOINER	JOINER	TOTAL
ACTUAL	NONJOINER	14276	5004	19280
	JOINER	307	306	612
	TOTAL	14583	5309	19892

SENSITIVITY: 49.8% SPECIFICITY: 74.0% CORRECT: 73.3%
FALSE POSITIVE RATE: 94.3% FALSE NEGATIVE RATE: 2.1%

would be wasted on the true NONJOINER. While it might be argued that predicting only half the true JOINERS is not a satisfactory improvement over other models, it should be remembered that the model does not include the use of variables representing quality measures, geographic location, family income, or those who have taken the entrance exam or joined the DEP. This has the overall effect of making the predictions quite conservative. Future studies in this area may include variables such as these and improve the predictive power of the model.

Table 4.30 gives the enlistment probability for a representative case and the probabilities of incremental changes to the representative case. For example, a change in the propensity of the representative case from negative to very positive increases the enlistment probability from 1.8 percent to 7.2 percent. Probabilities greater than 3 percent are considered JOINERS for this model. With the exception of

TABLE 4.30
ENLISTMENT PROBABILITY CALCULATIONS

VARIABLE	REPRESENTATIVE CASE				
PROPENSITY	NEGATIVE			VERY POS.	VERY POS.
AGE	18		19		17
JOINASOC	NO	YES			YES
RACE	WHITE				WHITE
EDSTAT	IN HS				HSEQUIV
EMPOPP	HARD				VERY HARD
MATHLEV	NO				NO
ENLISTMENT PROB. (PCT)	1.8	2.3	1.6	7.5	15.0

the PROPENSITY variable, no single incremental change to any of the other variables results in more than a 1 percent change in the probability of joining. However, the last example in Table 4.30 illustrates the dramatic effect of multiple changes interacting on the model. This is illustrated as a reminder of the potential pitfalls to using cross-tabulation type analysis of the relationship of a single variable to the enlistment decision alone. Of much greater importance is the effects of the interaction of all the factors.

V. CONCLUSIONS AND RECOMMENDATIONS

This thesis examined the relationship between stated intention measures, along with other demographic variables, and the enlistment decision. First, the relationship between individual variables and enlistment was examined through the use of 2x2 frequency tables, and second, a logistic, multinomial regression model was examined to study the interactive effects of all the variables on the enlistment decision. The data suggest the following conclusions:

- The three category propensity measure used in this study is a significant determinant of enlistment behavior, although its predictive power may have diminished somewhat from that found in studies using data from earlier years. This study found that only 10 percent of the highest propensity people enlist compared to 36 percent found in other studies. Similar reductions were seen for the other propensity groups as well.

- The propensity variable seemed to pick up most of the effects of both race and mathematics level suggesting that the importance of these two variables in models containing propensity measures are no longer as useful as they might have been in the past and do not add to the predictive power of the model.

- The relatively more positive propensity of the nation's high school students toward military service tends to moderate the overall negative propensity of the remainder of the youth population.

- Negative propensity people enlist at a two percent rate, but represent such a large portion of the youth population that they make up nearly 50 percent of all enlistees. This is an increase of 4 percentage points from previous studies.

- Blacks enlist in the service at twice the rate of whites.

- Enlistment in the military is a rare event when considering the youth population as a whole. Only 3 percent of the nation's youth enlist in the service.

- During of one of the longest periods of economic expansion the nations history, nearly eighty percent of the people who enlisted in the service between 1984 and 1989 perceived the prospects of finding full time employment as very hard or hard.

- Having a friend or relative sign up in the military in the last six months increases the probability of enlistment.

- Those who volunteer their Social Security Number on the Youth Attitude Tracking Study are a significantly different subgroup from those who do not choose to do so. However, a matter for further study is to determine if there is any difference in the enlistment behavior of the two subgroups.

The following are recommendations for further research studies in this area:

- Break out propensity measures by service to test the hypothesis that each service merits its own propensity equation.

- Combine the results of this study with those which estimate quality measures, and geographic variables to see if increases can be achieved in the predictive ability of the model.

- Investigate the effects of time between the survey and actual enlistment behavior on the model.

- Study the relationship of perceived full-time job search difficulty and actual local unemployment levels.

- Study the effects of increased recruiting efforts targeted at high school students. This group has the highest propensity towards the military service and its size and location can be determined with a fair amount of precision.

- Look into new incentives for recruiting leads from newly enlisted personnel and those who may have signed up recently. Their friends relatives are more likely to join at a rate which may justify the higher cost of these incentives and other direct marketing techniques directed at those new prospects.

APPENDIX A

The following questions, which are referenced in this study, are extracted from the Youth Attitude Tracking Study II Wave 18, Fall 1987 Report by the Research Triangle Institute.

Q402 - WHAT IS THE GENDER OF THE PERSON ON THE LINE?
[ASK IF NECESSARY: Are you male or female?]
1 = MALE
2 = FEMALE

Q403 - Just to be sure that the information we got earlier is correct, what was your age on your last birthday?
ENTER AGE IN YEARS

Q404 - Now I have a few questions about your educational experiences and plans. What is the highest grade or year of school or college that you have completed and gotten credit for?

GRADE SCHOOL
07 = LESS than 8th grade
08 = 8th grade

HIGH SCHOOL
09 = 9th grade
10 = 10th grade
11 = 11th grade
12 = 12th grade

4-YEAR COLLEGE OR UNIVERSITY
13 = 1st (FRESHMAN) YEAR
14 = 2nd (SOPHOMORE) YEAR
15 = 3rd (JUNIOR) YEAR
16 = 4th (SENIOR) YEAR

GRADUATE OR PROFESSIONAL SCHOOL
17 = 5th YEAR COLLEGE/1ST YEAR GRAD or PROF SCHOOL
18 = 2nd YEAR GRAD or PROF SCHOOL
19 = 3rd YEAR GRAD or PROF SCHOOL
20 = MORE THAN 3 YEARS GRAD or PROF SCHOOL

Q404 CONTINUED

JUNIOR COMMUNITY COLLEGE
21 = 1st YEAR
22 = 2nd YEAR

VOCATIONAL BUSINESS, or TRADE SCHOOL
23 = 1st YEAR
24 = 2nd YEAR
25 = MORE THAN 2 YEARS

Q405 - What kind of degrees, diplomas, or certificates have you received from the school(s) you've attended or for the training you've received? [ENTER CODE FOR EACH MENTION]
01 = NONE [ALLOWED FOR FIRST ENTRY ONLY, SKIP TO Q.407.]
02 = ADULT BASIC EDUCATION (ABE) CERTIFICATE
03 = GENERAL EDUCATION DEVELOPMENT (GED) H.S. EQUIVALENCY CERTIFICATE
04 = HIGH SCHOOL DIPLOMA
05 = CERTIFICATE FROM VOCATIONAL, BUSINESS OR TRADE SCHOOL (e.g., LICENSE TO PRACTICE A TRADE).
06 = 2-YEAR JUNIOR OR COMMUNITY COLLEGE (ASSOCIATE) DEGREE
07 = BACHELOR'S DEGREE
08 = ADVANCED GRADUATE OR PROFESSIONAL DEGREE (e.g., Master's, Ph.D., M.D., J.D., D.D.S.)
09 = OTHER DEGREE, DIPLOMA, CERTIFICATE

Q406 - Do you have a regular high school diploma, a GED, an ABE, or some other kind of certificate (of high school completion)?
1 = REGULAR HIGH SCHOOL DIPLOMA
2 = ABE (ADULT BASIC EDUCATION CERTIFICATE (e.g., CORRESPONDENCE, NIGHT SCHOOL)
3 = GED (GENERAL EDUCATION DEVELOPMENT) EQUIVALENCY CERTIFICATE
4 = SOME OTHER KIND OF CERTIFICATE OF HIGH SCHOOL EQUIVALENCY
5 = NONE OF THE ABOVE
* NOTE * Q406 is skipped if Q404 <= 11

Q407 - (In October, will you be/Are you) enrolled in any school, college, vocational or technical program, apprenticeship, or job training course?
1 = YES
2 = NO

Q408 or Q408A - What kind of school or training program (will you be/are you enrolled in? [IF MULTIPLE RESPONSE, ENTER HIGHEST CODE.]

01 = NO SCHOOLS OR TRAINING PROGRAM
02 = ADULT BASIC EDUCATION (ABE) (H.S. COURSES IN NIGHT SCHOOL OR BY CORRESPONDENCE)
03 = TAKING HIGH SCHOOL COURSES IN REGULAR, DAY HIGH SCHOOL
04 = GED OR H.S. EQUIVALENCY PROGRAM
05 = SKILL DEVELOPMENT PROGRAM (e.g., PUBLIC EMPLOYMENT, JOBS, OIC, WIN, JTPA)
06 = ON-THE-JOB TRAINING PROGRAM
07 = APPRENTICESHIP PROGRAM
08 = VOCATIONAL, BUSINESS OR TRADE SCHOOL
09 = 2-YEAR COLLEGE OR COMMUNITY COLLEGE
10 = 4-YEAR COLLEGE OR UNIVERSITY

Q436 - How easy or difficult is it for someone of your age to get a full-time job in your community? Is it...

1 = almost impossible,
2 = very difficult,
3 = somewhat difficult, or
4 = not difficult at all?

Q437 - How easy or difficult is it for someone of your age to get a part-time job in your community? Is it...

1 = almost impossible,
2 = very difficult,
3 = somewhat difficult, or
4 = not difficult at all?

Q438A through Q438E - Now, lets talk about your plans for the next few years. What do you think you might be doing? [Probe: Anything else?] [ENTER CODE FOR ALL MENTIONS.]

1 = GOING TO SCHOOL
2 = WORKING
3 = DOING NOTHING
4 = OTHER
5 = JOINING THE MILITARY/SERVICE

Q503 - How likely is it that you will be serving in the military? Would you say...

1 = definitely,
2 = probably,
3 = probably not,
4 = definitely not

Q682 - Has a good friend or relative of yours signed up with the military service within the last 6 months?

1 = YES
2 = NO

Now I have a list of high school mathematics and technical courses. As I read each one, please tell me whether you have taken or plan to take that course in regular high school.

Q706 - Intermediate algebra (ALGEBRA II)

1 = TAKEN
2 = PLAN TO TAKE
3 = NOT TAKEN

Q713A - What is the highest grade or year of school or college that your father completed?

07 = LESS than 8th grade
08 = 8th grade
09 = 9th grade
10 = 10th grade
11 = 11th grade
12 = 12th grade
13 = 1st YEAR COLLEGE/JR. or COMM. COLLEGE/VOCATIONAL, BUS., OR TRADE SCHOOL (FRESHMAN)
14 = 2nd YEAR COLLEGE/JR. or COMM. COLLEGE/VOCATIONAL, BUS., OR TRADE SCHOOL (SOPHOMORE)
15 = 3rd YEAR OF 4-YEAR COLLEGE (JUNIOR)
16 = 4th YEAR OF 4-YEAR COLLEGE (SENIOR)
17 = 5th YEAR COLLEGE/1ST YEAR GRAD. OR PROF. SCHOOL
18 = 2nd YEAR GRADUATE OR PROFESSIONAL SCHOOL
19 = 3rd YEAR GRADUATE OR PROFESSIONAL SCHOOL
20 = MORE THAN 3 YEARS GRADUATE/PROFESSIONAL SCHOOL

Q713 - What is the highest grade or year of school or college that your mother completed?

07 = LESS than 8th grade
08 = 8th grade
09 = 9th grade
10 = 10th grade
11 = 11th grade
12 = 12th grade
13 = 1st YEAR COLLEGE/JR. or COMM. COLLEGE/VOCATIONAL, BUS., OR TRADE SCHOOL (FRESHMAN)
14 = 2nd YEAR COLLEGE/JR. or COMM. COLLEGE/VOCATIONAL, BUS., OR TRADE SCHOOL (SOPHOMORE)
15 = 3rd YEAR OF 4-YEAR COLLEGE (JUNIOR)
16 = 4th YEAR OF 4-YEAR COLLEGE (SENIOR)
17 = 5th YEAR COLLEGE/1ST YEAR GRAD. OR PROF. SCHOOL
18 = 2nd YEAR GRADUATE OR PROFESSIONAL SCHOOL
19 = 3rd YEAR GRADUATE OR PROFESSIONAL SCHOOL
20 = MORE THAN 3 YEARS GRADUATE/PROFESSIONAL SCHOOL

Q714 - Do you consider yourself...[IF "HISPANIC" PROBE: Do you consider your race to be white, black, asian, or American Indian?]

1 = white?
2 = black?
3 = Asian or Pacific Islander? (INCLUDES CHINESE, JAPANESE, FILIPINO, KOREAN, VIETNAMESE, PACIFIC ISLANDER, ASIAN INDIAN OR OTHER ASIAN)
4 = American Indian or Alaskan Native?

Q715 - Are you of Hispanic background? [INCLUDES SPANISH-AMERICAN, MEXICAN-AMERICAN, PUERTO RICAN, CHICANO, CUBAN-AMERICAN, ETC.]

1 = YES, HISPANIC BACKGROUND
2 = NO, NOT HISPANIC BACKGROUND

Q716 - Now, I need your Social Security Number. By law, you do not have to tell me your Social Security Number, but it would help our study--so, can you tell me what it is? [PROBE: Would you look it up? I'll wait.]

ENTER THE 9 DIGIT SOCIAL SECURITY NUMBER OR THE CHARACTERS BELOW.

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